7120.5d
Integrated Baseline Review (IBR) Implementation Strategy

M. Gonzales
Jet Propulsion Laboratory
Project Business Manager
818-354-3629

IBR Mission Statement

Add value to the project management team by:

Gaining additional insight into the cost, schedule and technical plans established at each project phase gate and satisfy the requirements of the NASA prime contract.

IBR Goals

- Assist the project management team in understanding the viability of the cost and schedule plan to meet the project technical goals and statement of work.
- Provide confidence in the Earned Value information that is reported and as a predictor of future performance.
- Discern additional risks to project reserves
- Comply with prime contract requirements to gain highest possible award fee scores

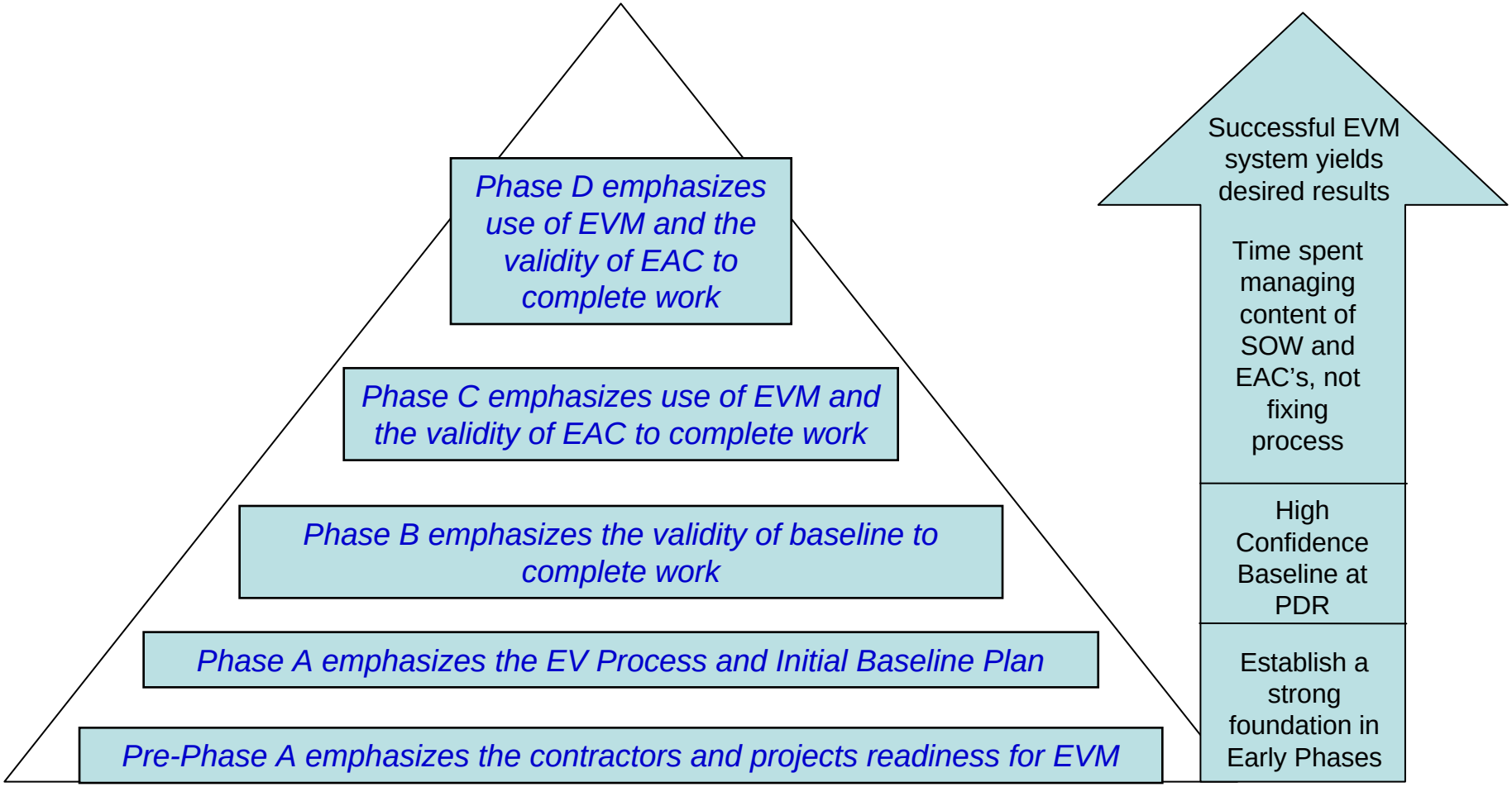
IBR Assumptions

- An IBR is a tool utilized by the project office
  - Project office manages the IBR implementation, but is supported by institution EV experts.
  - Project elements (subcontractors and major in-house builds) are treated the same and the project surveys these elements
- This implementation approach models the ‘design review’ concepts
  - Multiple reviews that ‘feed forward’ to the next review
    - Conduct ‘Process’ focused reviews early and address EVM system ‘design’ problems in Requirements and Preliminary Design Phases (Phases A and B)
    - Conduct ‘Content’ (Scope of Work and EAC’s) focused reviews in Detail Design/Build and Test Phases (Phases C and D)

IBR Strategy

- Based on 7120.5d Requirements
- Not a one time event, but a series of reviews that coincide with Project Phase Milestones or Key Decision Points
- Review focus evolves with project life cycle
  - Pre-Phase A – System description and EV compliance
  - Phase A – Test of planning, controls, reports
  - Phase B – Validate preliminary baseline, test system
  - Phase C - Validate baseline, validate reports, test EAC process
  - Phase D – Validate baseline, validate reports, test EAC process

IBR Strategy 'Pyramid of Success'



Reviews are Scalable

Each review in each phase should be 'sized' appropriate to the application

- Review 'sizing' is number of reviewer's involved, number of CAM's interviewed, size of data sampling, number of days and level of formality
- 'Risk Scale' represents level of visibility into EVM plans and processes.
  - Low risk – Low visibility required – Review size 'small'
  - High Risk – High visibility required – Review size 'large'

	Low Risk	Medium Low Risk	Medium High Risk	High Risk
EVM Considerations	Validated EVM System	EVM Experience - System not Validated	Immature EVM System	No EVM Capability
Technological Considerations	Build to Print	Medium to High Design Heritage	Little Design Heritage	New Hardware/New Technology
Programmatic Considerations	Above Design Principle Cost and Schedule Margins No Risk to Cost Cap	At Design Principle Cost and Schedule Margins - Attrition managable	At Design Principle Cost and Schedule Margins - Attrition rate puts Cost Cap at Risk	Below Design Principles for Cost and Schedule Margins. Attrition rate unsustainable. Will overrun Cost Cap
Contractual Considerations	Meets minimum dollar threshold Single Instrument C/SSR Reporting	Exceeds minimum dollar threshold More complex H/W or Subsystem CPR Reporting (format 1)	Exceeds minimum dollar threshold by xxx% Complex Subsystem or Segment Provider CPR Reporting (All formats)	Exceeds minimum dollar threshold by xxx% System Provider CPR Reporting (All formats)

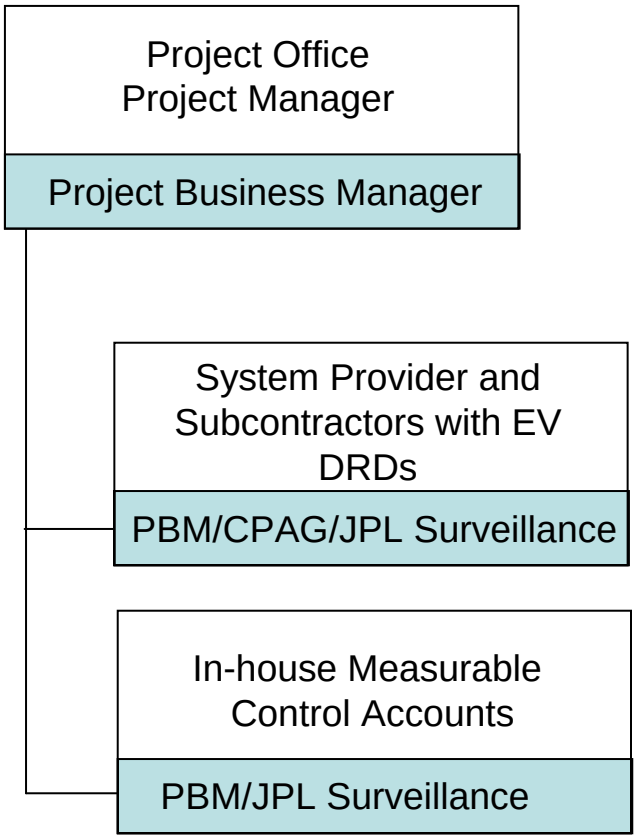
Implementation Pre-Phase A

7120.5d Requirements	**4.3.2.c.1.iii** - An assessment of ***potential infrastructure*** and workforce needs versus current plans, as well as opportunities to use infrastructure and workforce in other government agencies, industry, academia, and international organizations;
	4.3.2.c.1.v - Identification of conceptual acquisition strategies for proposed major procurements.

Pre- Review activities	Request for Proposals written and let with the EVM/IBR Strategy requirements Contractors submit EVM Plans with proposals EVM Implementation Team Defined Proposal reviewed for EVM Readiness EVM Team reports level of readiness

Review Level	Review Description	Review Criteria
Review Level 1 'Paper Review'	No formal review held. Analysis of submitted plans and other documents by Earned Value Implementation team deemed acceptable to retire EVM implementation risks.	Contractor deemed ready and has full EVM capability - Existing Validated System - Successful track record of EVM Implementation - Complete and comprehensive EVM descrption in Proposal
Review Level 2 On-Sight Contractor Demonstration	1/2 day review by Project Office Representatives and EV Implementation Team at contractor site. Contractor demonstrates ability to meet EVM objectives.	Contractor described capability requires additional investigation - No Validated System, but EVM principles implemented - Minimal or no track record of EVM Implementation - Additional insight required
Review Level 3 Progress Assessment Visit (PAV)	Two to three day visit by Project Office Representatives and EV Implementation Team. Contractor presents an overview of the system it intends to use. Review team gives a critique. Bi-laterally determine tentative schedule for IBR and Validation /sefl evalutation	Contractor needs validated system and does not have one - Validated System Description required - Formal Progress Assessments Required - Local DCMA involved in system validation

IBR Roles



Project office is responsible for planning and executing Integrated Baseline Reviews

- Authority delegated to Project Business Manager to coordinate and ensure reviews are conducted on all appropriate project elements

- Project Business Manager coordinates with CPAG and JPL EV Surveillance and Contractors counter parts to conduct on-site IBRs

- Project Business Manager coordinate with JPL EV Surveillance and PEMs to conduct IBRs on in-house measurable Control Accounts.

IBR Requirements (7120.5D)

	Project Phase	Project Phase Description	Project Rqmnt Number	Project Phase Requirement	Project Gates	Project Planning Rqmnt Id	Project Planning Events	Requirment ID/ EVM Milestones
Formulation	Pre-Phase A	Concept Studies	4.3.1	Purpose: During Pre-Phase A, a pre-project team studies a broad range of mission concepts that contribute to program and Mission Directorate goals and objectives. These advanced studies, along with interactions with customers and other potential stakeholders, help the team to identify promising mission concept(s) and draft project-level requirements. The team also identifies potential technology needs (based on the best mission concepts) and assesses the gaps between such needs and current and planned technology readiness levels. These activities are focused toward a Mission Concept Review and KDP A. A summary of the required gate products for this phase is provided in Table 4-3.	* Mission Concept Review	4.3.2.c.1.i	A high-level Work Breakdown Structure (WBS) consistent with the NASA standard space flight project WBS (Appendix G), a schedule, and a rough-order-of-magnitude cost estimate and cost range	* Progress Assessment Visit (PAV) * Validation Review (VR)
						4.3.2.c.1.iii	An assessment of potential infrastructure and workforce needs versus current plans, as well as opportunities to use infrastructure and workforce in other government agencies, industry, academia, and international organizations;	
						4.3.2.c.1.v	Identification of conceptual acquisition strategies for proposed major procurements.	

Pre-Phase A - Strategy

Project Emphasis:
- System Definition
- Identify potential contractors and teammates
- Identify contractors above $20M

EVM Emphasis:
- EVM implementation team defined
- Contractors develop EVM plan
- Progress Assessment Visit (PAV); Contractor presents EVM plan
- EVM team evaluates
- If Validation Review is required, EVM teams works with local DCMA
- Conduct follow-up PAV
- Support KDP A

Pre-Phase A emphasizes the contractors and projects readiness for EVM

IBR Requirements (7120.5D)

	Project Phase	Project Phase Description	Project Rqmnt Number	Project Phase Requirement	Project Gates	Project Planning Rqmnt Id	Project Planning Events	Requirment ID/ EVM Milestones
Formulation	Phase A	Concept & Tech Dev	4.4.1	Purpose: During Phase A, a project team is formed to fully develop a baseline mission concept and begin or assume responsibility for the development of needed technologies. This work, along with interactions with customers and other potential stakeholders, helps with the baselining of a mission concept and the program requirements on the project. These activities are focused toward System Requirements Review (SRR) and System Definition Review (SDR/PNAR) (or Mission Definition Review (MDR/PNAR)). The SRR and SDR/PNAR (or MDR/PNAR) process culminates in KDP B. A summary of the required gate products for this phase is provided in Table 4-3.	* System Requirements Review * System Design Review	4.4.2.c.5.ii	The project's ***preliminary*** Integrated Baseline includes a preliminary integrated master schedule, preliminary life-cycle cost estimate, workforce estimates, and the project's technical baseline/mission concept, all consistent with the program requirements levied on the project.	4.4.2.c.3 * Integrated Baseline Review (IBR)
						4.4.2.c.5.v	The ***preliminary*** life-cycle cost estimate includes reserves, along with the level of confidence estimate provided by the reserves based on a cost-risk analysis.	

Phase A - Strategy

Project Emphasis:
- Complete System Definition
- Establish Requirements
- Select Contractors
- Award Contracts with EVM DRDs

EVM Emphasis:
- Contractor teams develop initial project cost and schedule baseline
- Contractors submit EV reports per DRDs
- Project Office conducts IBR with emphasis on Process
    - Compliance to EV Process
    - Data Quality
    - CAM Knowledge
    - Change Control
    - Validity of Baseline relative to Scope of Work
- Support KDP B

Phase A emphasizes the EV Process and Initial Baseline Plan

IBR Requirements (7120.5D)

	Project Phase	Project Phase Description	Project Rqmnt Number	Project Phase Requirement	Project Gates	Project Planning Rqmnt Id	Project Planning Events	Requirment ID/ EVM Milestones
Implementation	Phase B	Preliminary Design & Technology Completion	4.5.1	Purpose: During Phase B, the project team completes its preliminary design and technology development. These activities are focused toward completing the Project Plan and Preliminary Design Review (PDR) /Non Advocate Review (NAR). The PDR/NAR process culminates in KDP C. A summary of the required gate products for this phase is provided in Table 4-3.	* Preliminary Design Review	4.5.2.c.5.ii	The project's Integrated Baseline includes the integrated master schedule, baseline life-cycle cost estimate, workforce estimates, and the PDR-technical baseline, all consistent with the program requirements levied on the project.	4.5.2.c.2 * Integrated Baseline Review (IBR)
						4.5.2.c.5.iii	The ***baseline*** life-cycle cost estimate is based on the PDR-technical baseline and integrated master schedule and is expected to include a review of the entire scope of work with a series of in-depth assessments of selected critical work elements of the WBS prior to and following the project's PDR/NAR preceding KDP C. (Note: The CADRe is updated to reflect changes.)	
						4.5.2.c.5.v	The ***baseline*** life-cycle cost estimate includes reserves, along with the level of confidence estimate provided by the reserves based on a cost-risk analysis.	

Phase B - Strategy

Project Emphasis:
- Project Requirements Baselined
- Preliminary Design Established
- LL Procurements Let

EVM Emphasis:
- EV System is mature
  - Reports Submitted
  - Logs Established
  - Change Control Exercised
- Project Office conducts IBR with emphasis on Risk to Reserves
  - Project Plan content
  - Completeness of Planning
  - Change control process
  - Basis of Estimate for Cost and Schedule
  - Can design be built with planned resources
  - Overall robustness of EVM system
  - Reconciliation to Phase A Baseline
- Support KDP C

Phase B emphasizes the validity of baseline to complete work

IBR Requirements (7120.5D)

	Project Phase	Project Phase Description	Project Rqmnt Number	Project Phase Requirement	Project Gates	Project Planning Rqmnt Id	Project Planning Events	Requirment ID/ EVM Milestones
Implementation	Phase C	Final Design & Fabrication	4.6.1	Purpose: During Phase C, the project completes the design that meets the detailed requirements and begins fabrication of test and flight article components, assemblies, and subsystems. These activities focus on preparing for the Critical Design Review (CDR) and the System Integration Review (SIR). This phase culminates in KDP D. A summary of the required gate products for this phase is provided in Table 4-3.	* Critical Design Review * Production Readiness Review * System Integration Review	4.6.2.c.1	Implement Earned Value Management (EVM) as documented in the Project Plan.	4.6.2.c.2 * Integrated Baseline Review (IBR)
						4.6.2.c.3	Provide immediate written notice and a recovery plan to the Program Manager and the MDAA, if the latest Phase C through D ***Estimate at Completion (EAC)*** of the project exceeds by 15% or more the KDP C-approved Integrated Baseline cost for Phases C through D. (Note: Since the Integrated Baseline cost contains project reserves, an EAC exceeding the Integrated Baseline cost presumes that these reserves will be exhausted.)	
						4.6.2.c.4	Provide immediate written notice and a recovery plan to the Program Manager and the MDAA, if a milestone listed for Phases C and D on the project life-cycle chart (Figure 2-4) is estimated to be delayed in excess of six months from the date scheduled in the KDP C-approved Integrated Baseline.	

Phase C - Strategy

Project Emphasis:
- Complete Flight and Ground Designs
- Conduct component and SS CDRs
- Build BB and EMs
- Initiate Acceptance Test Program for Flight HW

EVM Emphasis:
- Implement EV
- Project Office conducts IBR with emphasis on Risk to Reserves
    - Does Project Plan support detail design
    - Is EV data reliable as a predictor
    - Quality of VARs
    - Is the project using EVM data to manage
    - Test EAC process
    - Quality BOEs
    - Can HW be built for estimated cost
    - Is there sufficient schedule
    - Are Risks known and mitigated
    - Reliable reporting
- Support KDP D

Phase C emphasizes use of EVM and the validity of EAC to complete work

IBR Requirements (7120.5D)

	Project Phase	Project Phase Description	Project Rqmnt Number	Project Phase Requirement	Project Gates	Project Planning Rqmnt Id	Project Planning Events	Requirment ID/ EVM Milestones
Implementation	Phase D	System Assembly, Integration & Test, Launch	4.7.1	Purpose: During Phase D, the project performs system assembly, integration, and test. These activities focus on preparing for the Flight Readiness Review (FRR). This phase culminates in KDP E. A summary of the required gate products for this phase is provided in Table 4-3.	* System Acceptance Review * Operation Readiness Review * Flight Readiness Review	4.7.2.b.1	Implement Earned Value Management (EVM) as documented in the Project Plan	4.7.2.b.2 * Integrated Baseline Review (IBR)
						4.7.2.c.1	Provide immediate written notice and a recovery plan to the Program Manager and the MDAA if the latest Phase C through D ***Estimate at Completion (EAC)*** of the project exceeds by 15% or more the KDP C-approved Integrated Baseline cost for Phases C through D. (Note: Since the Integrated Baseline cost contains project reserves, an EAC exceeding the Integrated Baseline cost presumes that these reserves will be exhausted.)	
						4.7.2.c.2	Provide immediate written notice and a recovery plan to the Program Manager and the MDAA if a milestone listed for Phases C and D on the project life-cycle chart (Figure 2-4) is estimated to be delayed in excess of six months from the date scheduled in the KDP C-approved Integrated Baseline.	

Phase D - Strategy

Project Emphasis:
- Integration of Flight HW and SW
- Integrate Payload and Launch Vehicle

EVM Emphasis:
- Implement EV
- Project Office conducts IBR with emphasis on Risk to Reserves
    - Does Project Plan support I&T Program
    - Is EV data reliable as a predictor
    - Quality of VARs
    - Is the project using EVM data to manage
    - Test EAC process
    - Quality BOEs
    - Can I&T be completed for estimated cost
    - Is there sufficient schedule
    - Are Risks known and mitigated
    - Reliable reporting
- Support KDP E

Phase D emphasizes use of EVM and the validity of EAC to complete work

Precedence

MRO Phase CD - Due to persistent contractor over runs to EACs, NASA initiates two 'Work to Go Audits'

Work to Go Audit 1:

- Conducted right after Environmental Test Readiness Review
- 'Charge to the Board:
  - Assess to work-to-go and determine if adequate plans and margins are in place that can lead to a successful launch
  - Evaluate the remaining development risk and determine if it is reasonable given the effort and time to go to launch. Board may identify additional risk mitigation measures
  - Assess whether the workforce levels to achieve the work to go are reasonable and can achieve a successful launch campaign'

Work to Go Audit 2:

- Conducted prior to 'Ship to Cape' Milestone
- 'Charge to the Board:
  - Determine if appropriate progress has been made since the last audit
  - Identify the remaining effort-to-go between now and launch but focus on the period until ship
  - Evaluate if there are reasonable plans in place to accomplish this effort
  - Evaluate implementation margins and determine if they are factored into the program properly
  - Assess the residual risk and whether there are high priority items that need to be addressed prior to powering down the vehicle in April'

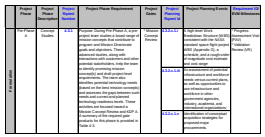
IBR Story Board

Formulation

Implementation

Pre-Phase A

IBR Requirements (7120.5D)



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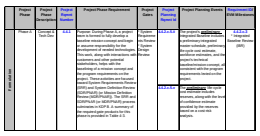
Pre-Phase A emphasizes the contractors and projects readiness for EVM

Phase A

IBR Requirements (7120.5D)



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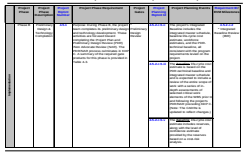
Phase A emphasizes the EV Process and Initial Baseline Plan

Phase B

IBR Requirements (7120.5D)



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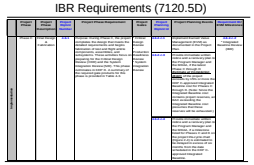
Phase B emphasizes the validity of baseline to complete work

Phase C

IBR Requirements (7120.5D)



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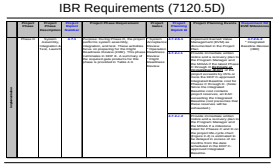
  - Quality of VARs
  - Is the project using EVM data to manage
  - Test EAC process
  - Quality BOEs
  - Can HW be built for estimated cost
  - Is there sufficient schedule
  - Are Risks known and mitigated
  - Reliable reporting
- Support KDP D

Phase C emphasizes use of EVM and the validity of EAC to complete work

Phase D

IBR Requirements (7120.5D)



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  - Is there sufficient schedule
  - Are Risks known and mitigated
  - Reliable reporting
- Support KDP E

Phase D emphasizes use of EVM and the validity of EAC to complete work

IBR emphasis evolves with project lifecycle. As project matures and moves forward the emphasis of IBR's matures and moves from process and EV tenets to validity of project cost and schedule to meet project objectives

Next Steps

- Implementation

Development of the process for Earned Value Management Excellence achieved utilizing Integrated Baseline Review Strategy